A C T 6 0 0 0

Advanced Communication Tester

SINE SIGNAL & NOISE GENERATOR - SELECTIVE LEVEL METER
CROSS TALK METER - SPECTRUM & NETWORK ANALYZER
LONGITUDINAL BALANCE & RETURN LOSS METER
MICROINTERRUPTION & IMPULSIVE NOISE METER
VOLTAGE - RESISTANCE - CAPACITANCE METER
TDR & RESISTANCE FAULT LOCATOR
POTS DEVICE SIMULATOR

ALL ON THE PALM OF YOUR HAND!

This new instrument combining various kinds of transmission, metallic and special tests, may be considered up to today the most advanced Test Set for qualifying and maintenance of advanced transmission systems and copper pairs used for various telecommunication services:

•POTS •ISDN •T1 • E1 •HDSL.1/2P •SHDSL •G.SHDSL •ADSL •VDSL

ERGONOMIC CHARACTERISTICS

One of **ACT6000** most interesting features is the colour LCD high resolution graphic display, a real "window" on the most advanced measurements' world.
The alphanumeric keypad, as well as the function-keys, grant to the instrument a high operating level. Moreover, don't miss to notice that, due to its accurate and intuitive "Human Machine and Graphics User Interface", this instrument doesn't need the help of the user's manual, if not to arrange and carry out unusual measurements and/or settings.

DATA-COMMUNICATION CHANNELS & COPPER PAIRS QUALIFICATION / CERTIFICATION

One **ACT6000**, if suitably configured, can perform easy and quick "Single-End Tests" or very accurate "End-to-End Tests" if coupled with another **ACT6000**. The wide kind of measurements of the **ACT6000** allows the qualification and certification on various communication carriers and copper pairs used for digital streams with a frequency occupancy up to 6 MHz (or 30 MHz optional); moreover, the instrument can automatically extrapolate the ADSL and VDSL maximum expected data rate of the copper line under test.

COPPER PAIRS DIAGNOSTIC & FAULTS FINDING / LOCATION

ACT6000 can be configured for high troubleshooting mission, by special functions and internal optional modules.
The complete adoption of these modules allows the simple and fast individualization of anomalies and/or faults on the copper line and communication systems.

ACT6000 – TECHNICAL CHARACTERISTICS

General

Case ..... : ABS shielded for EMI / EMC compatibility.
Connections ..... : ● "RTX" connectors IN/OUT and "TX" OUT triple banana-jack;
● polarized connector for external supply;
● RJ-45/4 connector for headset;
● USB & RS232 port for PC connector;
● USB for Pen-drive connector.
Display..... : LCD color 320 x 240 pixel (1/4 VGA) back-lighted.
Power supply (internal)..... : ● rechargeable battery pack (green) NiMh.
● external: from 16,5 to 26,5 Vdc / max 2,5 Ah.
Dimensions and Weight..... : 150 x 210 x 50 mm / 1,5 Kg. (batteries included).
Temperature range..... : operative: 0 ÷ +45° C. / stock -20 ÷ +70° C.
Humidity range ..... : 5 ÷ 90% no-condensing.
Overvoltage Protection..... : In/Out connectors up to 150 Vdc / 140 Vpp.
Reference Frequency accuracy.. : ±1 ppm within the operating temperature ±2 ppm/year.
Reference Level accuracy…….. : ±0.025% within the operating temp. ±0.025% / year.
CE mark - EMC ……: Directive 2004/108/CE, 89/336/EEC, Decree 2007/194
CISPR 11, ISO 14253 and CEI EN: 61326/A1/A2, 55011,
61000-4-2, 61000-4-3, 61000-4-4, 61000-4-6, 61000-4-11.
Special Features and Setup ..... : ● Full remote control by USB and RS232 port interface;
● Data and Results Storage on internal flash memory;
● Data and Results Export vs. PC and Pen Drive;

Signal Generator

Sine output frequency range ..... : ● base band: from 20 Hz to 20 kHz;
● middle band: from 20 kHz to 6 MHz;
● high band (optional): from 0.01 to 30 MHz.
Frequency Resolution..... : 1 Hz up to 9.999999 MHz; 10 Hz over 10.0 MHz.
Frequency setup mode…….. : manual on single frequency and steps mode on
programmable band / steps.
Output level ..... : -60 ÷ +20 dBm @ 150 Ω / 0.1 dB steps.
Output level accuracy..... : ±0.2 dB from 400 Hz to 20 kHz @ 600 Ω;
±0.2 dB up to 2 MHz, ±0.3 dB up to 6 MHz; @ 100 Ω;
±1 dB up to 30 MHz @ 100 Ω.
Balanced output impedances ..... : ● base band: 150, 200 and 600 Ω;
● middle band: 100, 110, 120, 135, 150 and 1350 Ω;
● high band 100 Ω.
Unbalanced output impedances . : 50 and 75 Ω by Banana/BNC optional adapter.

White Noise Generator ..... : 1 kHz ÷ 6 MHz / -74 ÷ -144 dBm/Hz / 0.1 dB steps.

Signal & Level Meter

Frequency range ..... : from 20 Hz to 6 MHz (two bands) base version;
up to a 30 MHz (with EBM 30 optional module).
Manual tuning / resolution…….. : 1 Hz up to 9.999999 MHz; 10 Hz over 10.0 MHz.
Level measurements mode…… : absolute (dBm or dBV or Volt) or relative (dBr).
Input range…….. : -120 ÷ +12 dBm @ 100 Ω / 0.1 dB Resolution.
Level meter accuracy…….. : ±0.2 dB from 400 Hz to 20 kHz @ 600 Ω;
±0.2 dB up to 2 MHz, ±0.3 dB up to 6 MHz; @ 100 Ω;
±1 dB up to 30 MHz @ 100 Ω.
Noise floor (TX OFF)…….. : ≤-130 dBm/Hz up to 30 MHz;
Frequency Meter sensitivity..... : ≤-50 dBm on wide band or selective mode.

Input impedances balanced..... : ● base band: 150, 200, 600 and >10 kΩ;
● middle band: 100, 110, 120, 135, 150 Ω and >10 kΩ;
● high band 100 Ω and >5 kΩ.
Input impedances unbalanced.... : 50 and 75 Ω by Banana/BNC adapter.
Noise filters……..…… : ● **base band**: psophometric; C-Message; 0.3 ? 3.4 kHz, 0.02 ÷ 3.4 kHz, 0.3 ÷ 6.0 kHz, 0.02 ÷ 6.0 kHz, 0.3 ÷ 15.0 kHz, 0.02 ÷ 15.0 kHz, 0.3 ÷ 20.0 kHz, 20 ÷ 20.0 kHz, 20.0 kHz flat,
● **middle/high band**: E, F, G and customs.
Selective filters / notch…… . : ● **base band**: (200 Hz ÷ 20 kHz) pass band and notch for S/N+D (dB and %) test; 10 Hz @ fo <200 Hz; 5% fo @ >200Hz fo <4 kHz; 200 Hz @ fo >4 kHz. selective for telegr.chann.: 120, 240, 360, 480 Hz.
● **high band** (20 kHz ÷ 6 or 30 MHz) selective: 25, 100, 200, 400 Hz and 1.74, 3.1, 4.0, 8.0, 16.0 kHz.

Spectrum and Network Analyzer

Frequency range ..... : ● from 200 Hz to 6 MHz (two band) base version;
● up to 30 MHz (by optional module EBM 30).
Input impedances balanced..... : ● base band: 150, 200, 600 and >10 kΩ;
● middle band: 100, 110, 120, 135, 150 Ω and >10 kΩ;
● high band 100 Ω and >5 kΩ.
Input impedances unbalanced.... : 50 and 75 Ω by Banana/BNC optional adapter.
- **Base band**, measure method .. : 200 ÷ 25000 Hz, by FFT analyzer (Kaiser window).
Span ..... : 6250, 12500 and 25000 Hz.
Resolution horizz. / vertical..... : - 250 pixel / 10 div. : 625, 1.250, 2.500 Hz / div.;
- 192 pixel / 8 div.: 1, 2, 3 ÷ 20 dB / div.
Resolution (BW) ..... : 50, 100, 200 .. Hz (other resolutions are interpolated).
- **Middle band**, measure method : 1 kHz to 6 (30) MHz, by Digital SSB quad. conversion.
Span ..... : 30 ranges: from 10 to 8000 kHz, 10 per decade.
Resolution horizz. / vertical..... : - 250 pixel / 10 div: 1, 2, 4, 8, 16.. ÷ 800 kHz / div.
- 192 pixel / 8 div.: 1 ÷ 20 dB / div.
Resolution (BW) ..... : 0.2, 0.5, 1, 2, 5, 8 kHz (other resolutions are Interpol.)
- **High band**, measure method... : 10 kHz to 30 MHz, double conversion receiver (optional module). Bands: 0 ÷12, 0 ÷ 18, 0 ÷ 30 MHz.
Level reading mode..... : absolute: dBm, dBm/Hz, dBV and dBr (relative).
Measurement mode……..... : normal, peak (max, mean or min. value), 2 Wires +/- (for Return-Loss measurement), 2 Wires +/+ (for Longitudinal Balancement measurement) and 4 Wires.
Input range ..... : from noise floor ÷ +12 dBm @ 100 Ω .
Noise floor (TX OFF)…….... : ≤-130 dBm/Hz up to 30 MHz;
Resolution marker (lev. / freq.) ... : 0.1 dB / as selected resolution (BW).
Network Analyzer ..... : by tracking generator or single freq. in 2/4 wires mode.

Mix measurements Generator/Meter and Network Analyzer

● **Cross-Talk (4 Wires)**
Test mode…….. ..... : Near-End (Single-End) and Far-End (End-to-End) single frequency or scanner on limited band.
Frequency range ..... : 200 Hz ÷ 6 MHz (up to 30 MHz - EBM 30 opt. module)
Measurement accuracy ..... : up to 2 MHz: ±1 dB / between 0 ÷ -90 dB;
up to 6 MHz: ±2 dB / between 0 ÷ -86 dB;
up to 30 MHz: ±3 dB / between 0 ÷ -80 dB.
Intrinsic crosstalk…….. . : ≤- 90 dB (with precise resistive load).

● **Return Loss (2 wires)**
Test mode …… ..... : single frequency or scanner on limited band.
Frequency range ..... : 200 Hz ÷ 6 MHz (up to 30 MHz - EBM 30 opt. module)
Measurement accuracy ..... : up to 2 MHz: ±1 dB / between 0 ÷ -50 dB;
up to 6 MHz: ±2 dB / between 0 ÷ -46 dB;
up to 30 MHz: ±3 dB / between 0 ÷ -40 dB.

● **Longitudinal Balance Loss (2 Wires + Gnd)**
Test mode …… ..... : single frequency or scanner on limited band.
Frequency range ..... : 200 Hz ÷ 6 MHz.
Measurement accuracy ..... : up to 2 MHz: ±1 dB / between 0 ÷ -60 dB;
up to 6 MHz: ±2 dB / between 0 ÷ -56 dB;

● **Single-End Insertion Loss** (with Advanced Software 1)
Measuring Mode / readout..... : by FDR technology on High-Band / Spectral readout.
Operating Band ..... : direct: 100 kHz ÷ 1500 kHz
Graphic Extrapolation..... : 20 kHz ÷ 2.2 and 30 MHz.
Operative Impedance ..... : 120 Ω (default) balanced line.
Operative limits..... : minimum line length: 100 meters;
maximum attenuation (before extrapolation): 56 dB.

Event Tests

● **Micro-Interruptions - O.62 (base band) and wide band**
Threshold level ..... : -3 ÷ -20 dB - 2 kHz Test Tone (default) or on
programmable input frequency up to 6 MHz.
Monitoring time..... : 4 min. ÷ 24 ours.
Events indicators ..... : 5 Counters (0.3ms ÷ >1min); Event/Time ; Secs with Events.
Readout..... : Tabular and Time Domain Histogram representation.
Measure facilities..... : 2 kHz reference tone output from TX connector for loopback tests.

● **Impulsive Noise O.71 (base band) and wide band** (with Advanced Software 2)
- Threshold level..... : 0 ÷ -60 dBm.
- Base band BW filters..... : 200 ÷ 12,000 Hz Flat, 600 ÷ 3,000 Hz, 300 ÷ 500 Hz.
- DSL bands / PB filters ..... : 20 kHz ÷ 6 MHz (E, F, G and special filters)
- Monitoring time..... : 4 min. ÷ 24 hours.
- Events indicators..... : 1 Event Counter; Event/Time Ratio; Secs. with Events.
- Readout..... : Tabular and Time Domain Histogram representation.

Special Measurements

● **Line Immunity by White Noise injection**
- Output level range..... : -70 ÷ -144 dBm/Hz @ Zref 100Ω - 0.1 dB Resolution.
- Output impedance..... : 1350 Ω (balanced).
- Ref. impedances ..... : 100, 120, 135, 150 Ω.
- Bandwidth ..... : 1 kHz ÷ 6 MHz.

● **TDR Fault locator**

Distance ranges……..... : 90, 180, 450, 900, 1800, 3600, 7200 m. @ 0.600 PVF.
Zoom…….. : vertical: -8 ÷ +77 dB; horizontal : 1x, 2x, 4x.
Distance resolution (by marker).. : - minimum range: about 0.4 meters (or 1 feet);
- maximum range: about 40 meters (or 100 feet).
Operative mode…… : single line (2 wires), Crosstalk (4 Wire), Differential by relative comparation with other line; Monitoring to events localization by Peak mode (Sample & Hold).
Pulse output level……. ... : short and long: 2.2 Vpp; Boost: 5.5 Vpp.
Pulse length…… ... : automatic on range selection, from 10 to 5000 ns.;
IN/OUT impedance…..…… : 100, 110, 120, 135, 150 Ω (balanced)
TGC (automatic gain control).. ... : 0 ÷ 6 dB/km.
Propagation velocity……..... : PVF: 0,300 to 0,999 o PV (90 to 300 m/μs)

● **Digital Multimeter DC / AC** (by DMM optional module)

Measuring mode..... : between a-b; a-c (Gnd); b-c (Gnd) and reverse.

DC Voltage, Range / Accuracy... : 0 ÷ 140 Vdc / ≤ 2% of reading ±1 digit.
AC Voltage, Range / Accuracy ... : 0 ÷ 100 Vrms / ≤ 2% of reading ±1 digit (up to 1kHz).

DC Resistance / Insulation
- Test Voltage ..... : ≤ 100 Vdc (with current limitation 1mA max).
- Range / Accuracy..... : 2 ÷ 500 MΩ / 5 Ω ÷ 200 MΩ: ≤ 2% of reading ± digit.

LINE LENGTH BY LOOP RESISTANCE
- Line length evaluation ..... (as function of measured resistance)
- Line Resistance..... : 10 to 999 Ω /m or 3 to 304 Ω /ft .
- Range / Resolution..... : 0 to 99.999 kUnits (meters or feet) / 1 units.
- Accuracy ..... : as derived from measured resistance.

DC CAPACITANCE (time of DC discharge method)
- Test Voltage ..... : ≤ 100 Vdc
- Range / Accuracy..... : > 10 nF ÷ 10 μF / ≤5% of reading ± 1 digit.

AC CAPACITANCE (by capacitive bridge)
Measuring mode..... : by 1 kHz tone – 1.1 Vpp between: a-b; a-Gnd; b-Gnd.
Range / Resolution..... : 0.1 to 3000 nF / 0.1 nF.
Accuracy..... : ± 1% of reading ± 1 nF @ C <500 nF;
± 5% of reading ± 1 digit @ C >500 nF and < 3000 nF.

LINE LENGTH BY CAPACITANCE
Line length estimation..... : (as function of measured capacitance):
Line Capacitance setup..... : 10.0 to 300.0 pF / Length Unit.
Range / Resolution / Accuracy ... : 1 to 99999 Units (m. or ft.) / 1 units / as derived from measured capacitance.

RFL (Resistance Fault Locator)
- Loop resistance..... : 7 kΩ maximum.
- Fault resistance..... : 20 MΩ.
- Accuracy of RTF @ 1 M? . ..... : ± 0.1% of Loop resistance.

POTS module ** (optional module installed on DMM module)
Dial Encoder..... : Pulse (100ms off/on ratio 40/60%); DTMF std. tones
Ring Detect. Range & Meas ..... : Level: 10 ÷ 90 Vrms; Frequency: 15 ÷ 70 Hz.
Ring Detector AC Load..... : R 7310 Ω ± 2% in series + 940nF ±10% capacitor.
Ring current self limitation ..... : ≤ 15 mA peak ; safety fold-back limited.
On Hook / Break & Make specs.. : R = 120 Ω ±2% @ I = 100 mA; Voffset = 4 Vdc.

Automatic SELTest for line pre-qualification *
With **single ACT6000** - **Single-End Tests on open lines**, using the pre-configured masks for: **Voice, ISDN, HDSL, E1, T1, SDSL, G.SHDSL, ADSL, ADSL2+** and **VDSL 1 / 2**.
2 or [4] Wire mode:
Metallics (by DMM module): AC / DC Voltage, Insulation, AC / DC Capacitance, End-Of-Line (by TDR).
Transmissives: Noise (local), Return-Loss, Longitudinal Balance-Loss, "FDR" Insertion-loss & frequency response estimation, Noise (far-end estimation), SNR prediction, ADSL - ADSL2+ and VDSL 1/2 *** Bit-Rate prediction, [NEXT].

Automatic DELTest for line qualification **
With **two ACT6000** (Master/Slave configuration) for **Double-End Tests on lines**, using the pre-configured masks for: **Voice, ISDN, HDSL, E1, T1, SDSL, G.SHDSL, ADSL, ADSL2+**, **VDSL 1 / 2** and Base band: **M1040, M1020, G.712E2, EURO16k, EURO32k, MIL16k, MIL32k**
2 or [4] Wire mode:
Only Transmissives: Noise (bilateral), Return-Loss (bilateral), Longitudinal Balance-Loss (bilateral "LCTL"), Insertion-Loss, SNR (bilateral), ADSL - ADSL2+ and VDSL*** Bit-Rate evaluation (Up & Down stream), [NEXT and FEXT].

Notes:
** by Advanced Software 1*
*** by Advanced Software 2*
******** *by adoption of EBM 30 optional module*

Accessories (base kit):
ACT6000 Base instrument, included:
- Nylon Carrying Case with the pocket for accessories;
- User Guide (English or Italian language, as requested);
- AC Power Supply and Battery Charger (Line Input: 220 Vac; Output: 20 Vdc; 1.4A);
- Banana-Banana + Crocodiles shielded cable (2.30m total length);
- Ground Cable unipolar Banana-Crocodile cable;
- USB Pen-Drive.

Accessories and optional modules
- **ASW1 - Advanced Software 1** (see the above description)
- **ASW2** - **Advanced Software 2,** included PC utility programs: Full Remote Control, Soft. Update, Capture Screen, Export & Read Saved Tests, ANSI or ETSI Masks Editor;
- **ACT-11** POTS Module (Subscriber Simulator Module for POTS for signalling tests) [1];
- **ACT-12** DMM Module (Digital Multimeter Module for metallic tests);
- **ACT-13** EBM30 Module (Extension Band Module for 30 MHz operation);
- **ALT-05** Headset with 2m cable and RJ-45/4 connector [1];
- **ALT-09** Resistive Termination Set (100, 120, 135, 150 and 600 Ω);
- **ALT-15** Probe to perform High Band PSD measurements on powered lines;
- **ALT-16** Banana to BNC Adapter;

Note [1]: options applicable only for the "Advanced Software 2".

ATEN S.r.l. - Via dei Lavoratori, 180 - 04100 LATINA - ITALY
Tel.: +39 0773 240696 Fax: +39 0773 240676 - e-mail: sales@aten.it - Web: www.aten.it

Aten S.r.l. reserves the right to change this preliminary specifications without prior notice